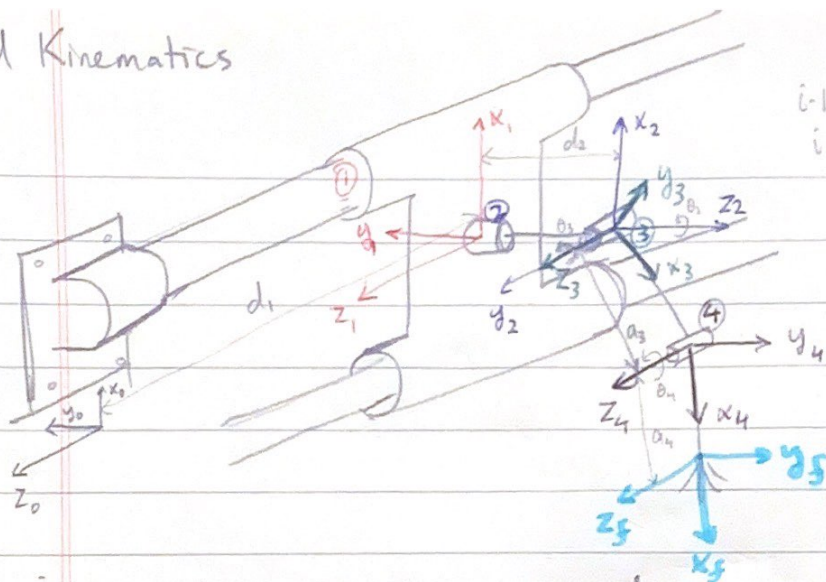


Forward Kinematics



$${}^{i-1}_i T = \begin{bmatrix} c\theta_i & -s\theta_i & 0 & a_i \\ s\theta_i c\alpha_{i-1} & c\theta_i c\alpha_{i-1} & -s\alpha_{i-1} & -s\alpha_{i-1} d_i \\ s\theta_i s\alpha_{i-1} & c\theta_i s\alpha_{i-1} & c\alpha_{i-1} & c\alpha_{i-1} d_i \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$i-1$	i	α_{i-1}	a_{i-1}	d_i	θ_i
0	1	0	0	d_1	0
1	2	90°	0	d_2	θ_2
2	3	-90°	0	0	θ_3
3	4	0	a_3	0	θ_4
4	5	0	a_4	0	0

$${}^0_1 T = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & d_1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^1_2 T = \begin{bmatrix} c\theta_2 & -s\theta_2 & 0 & 0 \\ 0 & 0 & -1 & -d_2 \\ s\theta_2 & c\theta_2 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^2_3 T = \begin{bmatrix} c\theta_3 & -s\theta_3 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -s\theta_3 & -c\theta_3 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^3_4 T = \begin{bmatrix} c\theta_4 & -s\theta_4 & 0 & a_3 \\ s\theta_4 & c\theta_4 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^0_4 T = \begin{bmatrix} c_2 c_{34} & -c_2 s_{34} & -s_2 & a_3 c_2 c_3 \\ s_{34} & c_{34} & 0 & a_3 s_3 - d_2 \\ s_2 c_{34} & -s_2 s_{34} & c_2 & d_1 + a_3 s_2 c_3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^4_5 T = \begin{bmatrix} 1 & 0 & 0 & a_4 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^0_5 T = \begin{bmatrix} c_2 c_{34} & -c_2 s_{34} & -s_2 & a_4 c_2 c_{34} + a_3 c_2 c_3 \\ s_{34} & c_{34} & 0 & a_4 s_{34} + a_3 s_3 - d_2 \\ s_2 c_{34} & -s_2 s_{34} & c_2 & a_4 s_2 c_{34} + d_1 + a_3 s_2 c_3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$